IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNITED STATES GYPSUM COMPANY,	)	
Plaintiff,	)	
v.	)	**Civil Action No. 07 cv 6381**
	)	**Judge Darrah**
3M INNOVATIVE PROPERTIES COMPANY and 3M COMPANY,	)	**Magistrate Judge Keys**
Defendants.	)	

Declaration of Jeffrey B. Burgan

Jeffrey B. Burgan declares as follows:

1. I am Jeffrey B. Burgan, one of the attorneys representing United States Gypsum Company in the above captioned suit.

2. Attached as Exhibit 1 hereto is a true and correct copy of a paper entitled Communication Under 37 CFR §1.607 taken from the prosecution history of Application No. 11/029759, filed January 5, 2005, which issued as U.S. Patent No. 7,052,544.

3. Attached as Exhibit 2 hereto is a true and correct copy of a communication between 3M and USG, Re: Licensing Opportunity for 3M's Low Dust Joint Compound Patent Portfolio.

4. Attached as Exhibit 3 hereto is a true and correct copy of the Patent Application Publication for Publication No.: US 2005/0119388 A1, which issued as U.S. Patent No. 7,052,544.

5. Attached as Exhibit 4 hereto is a true and correct copy of *Bowe, Bell + Howell Co. v. Midsouth Technologies, LLC*, No. 05 C 571, 2005 WL 1651167 (N.D. Ill. June 30, 2005).

6. Attached as Exhibit 5 hereto is a true and correct copy of *Claber, S.p.A v. Lowe's Co., Inc.*, No. 98 C 4760, 1999 WL 166974 (N.D. Ill. March 23, 1999).

7. Attached as Exhibit 6 hereto is a true and correct copy of *Compuware Corp. v. Health Care Service Corp.*, No. 01 C 0873, 2002 WL 31598839 (N.D. Ill. Oct. 31, 2002).

8. Attached as Exhibit 7 hereto is a true and correct copy of *Health Care Discovery Corp. v. Ciphergen Biosystems, Inc.*, No. 2:06-CV-260, 2007 WL 128283 (E.D. Tex. Jan. 11, 2007).

9. Attached as Exhibit 8 hereto is a true and correct copy of *Macon Elec. Coil, Inc. v. Amphenol Corp.*, No. 05 C 2397, 2006 WL 1026884 (E.D. Mo. April 18, 2006).

10. Attached as Exhibit 9 hereto is a true and correct copy of *New Products Marketing Corp. v. Lowe's Companies, Inc.*, No. 4:06-cv-35, 2006 WL 2811502 (D.N.D. Sept. 21, 2006).

11. Attached as Exhibit 10 hereto is a true and correct copy of *Vanguard Products Group, Inc. v. Protex Int'l Corp.*, Inc., No. 05 C 6310, 2006 WL 695700 (N.D. Ill. Mar. 14, 2006).

12. I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge

Executed in Chicago, Illinois, this 4th day of January, 2008

Jeffrey B. Burgan

ATTORNEY FOR UNITED STATES GYPSUM COMPANY

EXHIBIT 1

Patent
Case No.: 54493US012

32692
Customer Number

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	LANGFORD, NATHANIEL P.		
Application No.:	Unassigned	Group Art Unit:	1713
Filed:	Herewith	Examiner:	K. Egwim
Title:	LOW DUST WALL REPAIR COMPOUND		

COMMUNICATION UNDER 37 CFR §1.607

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Please consider this Communication in connection with the Divisional Application filed herewith in the above-referenced application. It is believed that no fee is due; however, in the event a fee is required, please charge the fee to Deposit Account No. 13-3723.

REMARKS

Claims 1-5 and 8-11 are copied verbatim from U.S. Patent No. 6,673,144, granted January 6, 2004, to Immordino, Jr. et al., and claims 6 and 7 are copied substantially from that patent except they have been changed to depend from claim 1. Claims 1-11 now pending in the present application correspond to Immordino's claims as follows:

Claim of Present Application	Corresponding Immordino Claim
1	1
2	2
3	3
4	5
5	6
6	8
7	9
8	18
9	19
10	20
11	21

In accordance with 37 CFR 1.607(a), the copied claims may be specifically applied to Applicant's disclosure as follows:

Copied Claim	Applicant's Disclosure
1	page 1, lines 15-17, page 5, line 16, page 8, line 29, page 13, lines 1-7, page 16, line 8 to page 17, line 17 (note: Carbowax 540 is a synthetic polymeric wax, is 73 % by weight soluble in water at 20° C, and is a solid at room temperature)
2	page 7, lines 12-13
3	page 13, line 7 (Carbowax 540 has a melting temperature of 38-41° C)
4	page 7, lines 14-23
5	page 8, lines 19-25
6	page 7, lines 4-13
7	page 17, line 14
8	page 8, lines 19-25
9	page 1, line 25, page 2, line 6, page 5, line 28, page 6, line 2
10	Id.
11	Id.

In further support of Applicant's contention that each term of the copied claims is fully supported by Applicant's disclosure, Applicant submits herewith product literature for Carbowax™ brand

polyethylene glycols and methoxypolyethylene glycols. In particular, page 4 of the product literature indicates that Carbowax represents a family of water soluble linear polymers formed by the addition reaction of ethylene oxide. Page 4 also provides that Carbowax PEG 540 is a 41/59 weight percent mixture of PEG 300 and PEG 1450, and glycerin-started Carbowax Trifunctional Polyethylene Glycol (TPEG) 990. Page 5 indicates that Carbowax 540 blend is a soft, opaque, white solid at 27° C (i.e. room temperature). And page 14 indicates that Carbowax 540 blend has a melting or freezing range of 38 to 41° C, and a solubility in water at 20° C, by weight percent, of 73%.

Pursuant to 37 CFR §1.607(a)(1), Applicant presents the following proposed count 1:

1. A joint compound composition comprising a filler, a binder, a thickener and one or more synthetic polymeric waxes, wherein each of said one or more waxes is at least slightly soluble in water and forms a solid at room temperature.

Applicant submits that proposed count 1 corresponds to Immordino claim 1 and to Applicant's claim 1.

Because the present application has an effective filing date of December 10, 1998, and because the claim of the present application identified as corresponding to the proposed count was added within one year from the date on which the Immordino patent was granted (i.e. January 6, 2004), the requirements of 35 U.S.C. 135(b) are met.

Respectfully submitted,

JANUARY 5, 2005
Date

By: David B Patchett
David B. Patchett, Reg. No.: 39,326
Telephone No.: (651) 736-4713

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

EXHIBIT 2

Jeffrey P. Tane
Technical Director

3M Construction and Home
Improvement Markets Division

3M Center, Building 0251-01-C-09
St. Paul, MN 55144-1000
651 736 2490 Office
651 737 5544 Fax

June 9, 2005

Kevin Courtney
Senior VP Sales
USG Corporation
125 S. Franklin Ave.
Chicago, IL 60047

Re: Licensing Opportunity for 3M's Low Dust Joint Compound Patent Portfolio

Dear Kevin,

It has just come to our attention that USG has launched its new product Sheetrock® Joint Compound Lightweight All Purpose Plus3™ with Dust Control. As you are aware, 3M owns a portfolio of patents and patent applications relating to low dust joint compounds and their methods of use. I am pleased to let you know that 3M remains willing to make this technology and patent portfolio available for licensing to USG. We hope you will share in 3M's efforts to commercialize this pioneering technology and in bringing its many benefits to consumers and professional builders around the world.

Since 3M and USG last discussed this matter, 3M has continued to obtain and prosecute claims covering various formulations of low dust joint compounds and their methods of use. A copy of 3M's published patent application (U.S. Pat. Appl. Ser. No. 2001/0011112 A1) is enclosed for your review. As you will see from the published patent application, 3M already has provisional rights and is seeking claims that will cover joint compounds with a wide variety of dust reducing additives, including, for example, a dust reducing additive comprising a wax (Claims 1, 5, and 20). 3M intends to continue its prosecution of claims in the U.S. and elsewhere that will cover joint compounds with many different types of dust reducing additives.

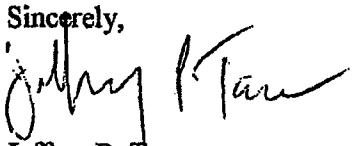
When 3M and USG last discussed this matter, we explored the possibility of licensing 3M's technology to USG. However, the terms that USG proposed – somewhere between 0-1% of sales – did not fully reflect the value and benefits of 3M's low dust joint compound technology. We noted with interest the claims that accompanying USG's launch of its new Sheetrock® Joint Compound Lightweight All Purpose Plus3™ with Dust Control product. Those claims printed on the product container tout that the product "reduces airborne sanding dust," has "less mess and faster cleanup," and is "great for remodeling projects." Those claims, coupled with the premium pricing of the product, are certainly indicative of the value of low dust additives in joint compounds.

It appears to us that USG has recognized the benefits and value that low dust additives will provide to users of joint compounds. Customers such as The Home Depot have certainly recognized these benefits, as evidenced by its launch of USG's new Sheetrock® Joint Compound Lightweight All Purpose Plus3™ with Dust Control product.

We are hopeful that USG's, its customers' and others' recognition of the benefits of low dust joint compound technology will provide the springboard to more fruitful licensing discussions. Once we are able to reach agreement on the basic terms, our lawyer will draft a formal license agreement for your review.

We look forward to hearing from you promptly, and I encourage you to have your attorney contact our intellectual property attorney, Melissa Buss, to begin negotiations. Melissa can be reached at (651) 733-0649 or at mebuss@mmm.com.

Sincerely,



Jeffrey P. Tane
Technical Director

Enclosures

c.c. Mike Geoffrey, USG Legal Department (w/ enclosures)
Melissa Buss, Office of Intellectual Property Counsel, 3M Legal Affairs

EXHIBIT 3

US 20050119388A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0119388 A1**

Langford (43) **Pub. Date: Jun. 2, 2005**

(54) **LOW DUST WALL REPAIR COMPOUND**

(75) Inventor: **Nathaniel P. Langford**, Somerset, WI (US)

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PO BOX 33427
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(73) Assignee: **3M Innovative Properties Company**

(21) Appl. No.: **11/029,759**

(22) Filed: **Jan. 5, 2005**

Related U.S. Application Data

(60) Division of application No. 10/788,053, filed on Feb. 26, 2004, now Pat. No. 6,863,723, which is a division of application No. 09/821,392, filed on Mar. 29, 2001, now Pat. No. 6,733,581, which is a continuation-in-part of application No. 09/208,782, filed on Dec. 10, 1998, now Pat. No. 6,358,309.

Publication Classification

(51) **Int. Cl.**[7] **C09D 4/00**

(52) **U.S. Cl.** **524/423**; 106/250; 106/251; 106/267; 106/504; 106/657; 106/659; 106/661; 106/665; 524/487; 524/424; 524/476

(57) **ABSTRACT**

A wall repair compound useful for filling and repairing cracks, holes, and other imperfections in a wall surface includes a conventional filler material, a conventional binder material, and a dust reducing additive which reduces the quantity of airborne dust particles generated when sanding the hardened joint compound. Airborne dust reducing additives include oils, surfactants, solvents, waxes, and other petroleum derivatives. The additive can be added to conventional ready-mixed joint compounds and to setting type joint compounds. A method of reducing the quantity of airborne dust generated when sanding a fully hardened joint compound includes mixing a sufficient quantity of the dust reducing additive with the joint compound prior to when the joint compound has been applied to the wall.

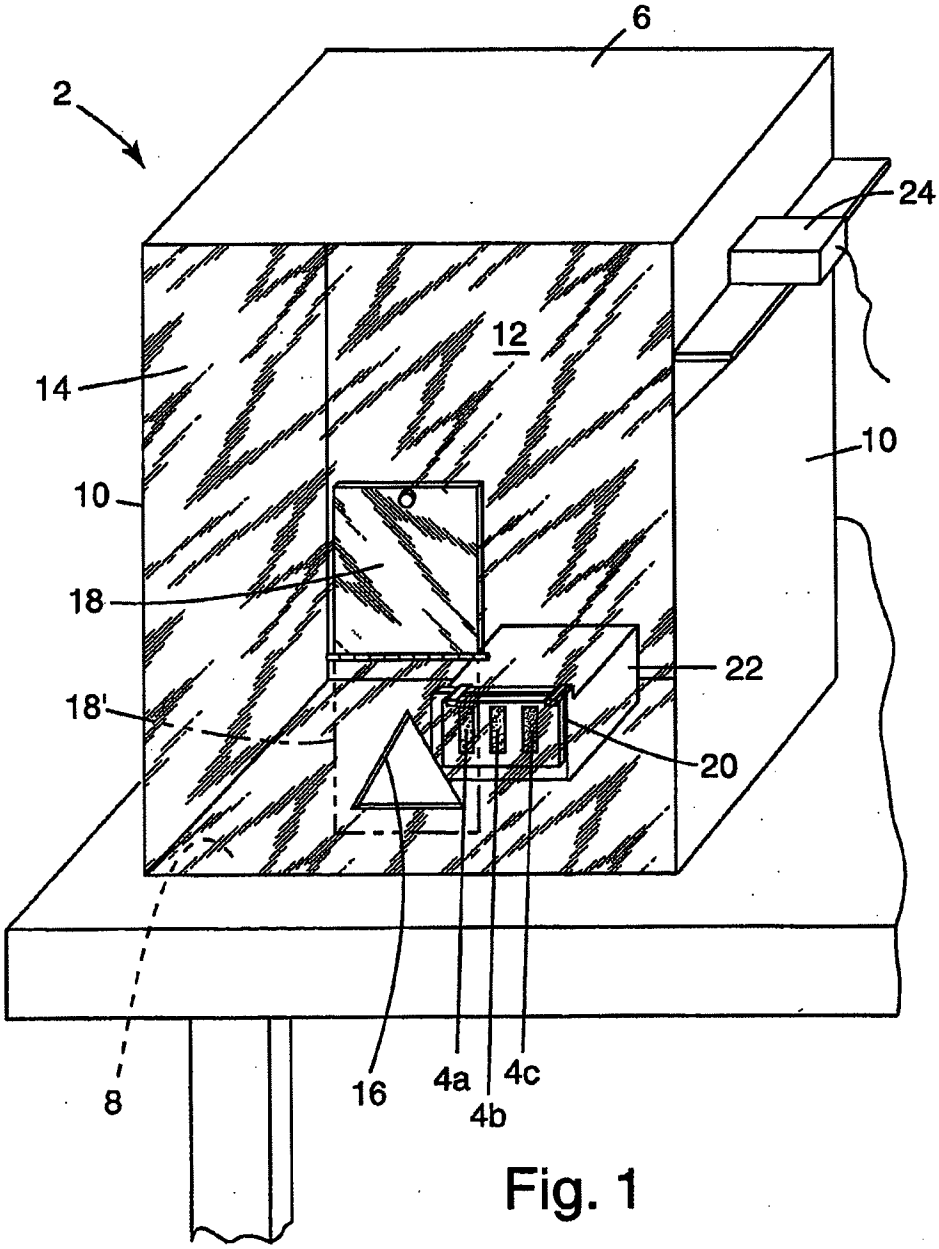

Fig. 1

LOW DUST WALL REPAIR COMPOUND

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. application Ser. No. 10/788,053, filed Feb. 26, 2004, which is a divisional of U.S. application Ser. No. 09/821,392, filed Mar. 29, 2001, issued as U.S. Pat. No. 6,733,581, which is a continuation-in-part of U.S. application Ser. No. 09/208,782, filed Dec. 10, 1998, issued as U.S. Pat. No. 6,358,309.

FIELD OF THE INVENTION

[0002] The present invention relates generally to wall repair compounds such as joint compounds, spackling compounds, and the like used to repair imperfections in walls or fill joints between adjacent wallboard panels. More particularly, the present invention relates to such a wall repair compound that includes an additive which reduces the quantity of airborne dust generated when the hardened compound is sanded.

BACKGROUND OF THE INVENTION

[0003] Interior walls of residential and commercial buildings are often constructed using gypsum wallboard panels, often referred to simply as "wallboard" or "drywall." The wallboard panels are attached to studs using nails or other fasteners, and the joints between adjacent wallboard panels are filled using a specially formulated adhesive composition called joint compound to conceal the joints. The procedure for concealing the joint between adjacent wallboards, and thereby producing a smooth seamless wall surface, typically includes applying soft wet joint compound within the joint or seam formed by the abutting edges of adjacent wallboard panels using a trowel or the like. A fiberglass, cloth, or paper reinforcing tape material is then embedded within the wet joint compound, and the compound is allowed to harden. After the joint compound has hardened, a second layer of joint compound is applied over the joint and tape to completely fill the joint and provide a smooth surface. This layer is also allowed to harden. Upon hardening, the joint compound is sanded smooth to eliminate surface irregularities. Paint or a wall covering, such as wall paper, can then be applied over the joint compound so that the joint and the drywall compound are imperceptible under the paint or wall covering. The same joint compound can also be used to conceal defects caused by the nails or screws used to affix the wallboard panels to the studs, or to repair other imperfections in the wallboard panels, so as to impart a continuously smooth appearance to the wall surface.

[0004] Various drywall joint compounds are known for concealing joints between adjacent wallboard panels. Conventional joint compounds typically include a filler material and a binder. Conventional fillers are calcium carbonate and calcium sulfate dihydrate (gypsum), which are used in "ready mixed" joint compounds, and calcium sulfate hemihydrate ($CaSO_4$-½ H_2O; also referred to as plaster of Paris or calcined gypsum), which is used in "setting type" joint compounds. Ready mixed joint compounds, which are also referred to as pre-mixed or drying type joint compounds, are pre-mixed with water during manufacturing and require little or no addition of water at the job site. Such joint compounds harden when the water evaporates and the compound dries. Setting type joint compounds, on the other hand, harden upon being mixed with water, thereby causing dihydrate crystals to form and interlock. Setting type joint compounds are therefore typically supplied to the job site in the form of a dry powder to which the user then adds a sufficient amount of water to give the compound a suitable consistency.

[0005] The Koltisko, Jr. et al. U.S. Pat. No. 4,972,013 provides an example of a ready-mixed (wet) joint compound including a filler, binder, thickener, non-leveling agent, and water. The McInnis U.S. Pat. No. 5,277,712 provides an example of a setting (dry mix-type) joint compound including a fine plaster material, such as stucco, a material which imparts internal strength and workability to the joint compound, such as methyl cellulose, and a material for retaining water, such as perlite. Additional examples of joint compounds are provided in the Brown U.S. Pat. No. 4,294,622; the Mudd U.S. Pat. No. 4,370,167; the Williams U.S. Pat. No. 4,454,267; the Struss et al. U.S. Pat. No. 4,686,253; the Attard et al. U.S. Pat. No. 5,336,318; and the Patel U.S. Pat. No. 5,779,786.

[0006] A spackling compound is disclosed in the Deer et al. U.S. Pat. No. 4,391,647. While joint compound and spackling compound do many of the same things and are both smeared onto walls to hide flaws, spackling compound is generally lighter, dries more quickly, sands more easily, and is more expensive than joint compound. For simplicity, joint compound, drywall joint compound, and like expressions are used throughout this specification to refer to wall repair compounds generally, including joint compound and spackling compound.

[0007] Sanding hardened joint compound can be accomplished using conventional techniques including power sanders, abrasive screens, or manual sanders which consist simply of a supporting block and a piece of abrasive paper mounted on the block. Sanding the joint compound, however, produces a large quantity of an extremely fine powder which tends to become suspended in air for a long period of time. The airborne particles settle on everything in the vicinity of the sanding site and usually require several cleanings before they can all be collected, thereby making cleanup a time consuming and tedious process. The particles may also present a serious health hazard to the worker.

[0008] The airborne particles are highly pervasive and can enter the nose, lungs, eyes and even the pores of the skin. Results from a study conducted by the National Institute for Occupational Safety and Health found that dust levels in 9 out of 10 test samples taken at test sites where workers were finishing drywall with joint compound were higher than the limits set by OSHA. The report also said that the dust may not be safe even when it falls within the recommended limits. In addition, the study found that several dust samples contained silica and kaolin, a material found in clay, which have been found to cause permanent lung damage. The report recommended the use of local exhaust ventilation, wet finishing techniques, and personal protective equipment to reduce the hazard.

[0009] In an effort to reduce the dust generation and cleanup problems associated with the sanding of conventional joint compounds, various attempts have been made to develop specialized dustless drywall sanders. The Matechuk U.S. Pat. No. 4,782,632, for example, discloses a drywall

sander including a sanding head designed to minimize the release of dust and further discloses attaching a vacuum cleaner to the sanding head to collect the dust. The Krumholz U.S. Pat. No. 4,955,748 discloses a dustless drywall finisher which uses a wet sponge to prevent the formation of airborne dust.

[0010] Dust remains a problem, however, when conventional power sanders or hand sanders are used to sand conventional joint compounds. A need therefore exists for a joint compound that can be sanded using conventional sanders without producing a large quantity of fine particles capable of becoming suspended in air. It would also be desirable to provide an additive that could be mixed with commercially available joint compounds to inhibit the formation of airborne particles during the sanding procedure without otherwise interfering with the properties of the joint compound.

SUMMARY OF THE INVENTION

[0011] The present invention provides a wall repair compound, such as a joint compound or spackling compound which, when sanded, generates a lower lever of airborne particles than conventional joint compounds. More specifically, the present invention provides a wall repair compound which includes a dust reducing additive. Generally, the wall repair or joint compound includes a sufficient amount of the dust reducing additive so that when the joint compound is tested as described in this specification, it generates a lower quantity of airborne dust than the joint compound would produce if it did not contain the dust reducing additive.

[0012] The dust reducing additive can be pre-mixed into the wet joint compound prior to application or applied as a coating to the hardened joint compound after application. Generally, the dust reducing additive reduces the quantity of airborne dust particles having a size of less than or equal to 10 microns to less than 50% of the quantity that would be generated without the additive. In certain embodiments, the quantity of airborne dust particles is reduced by at least 75% compared to a mixture without the additive. Most preferably, the level of airborne dust is reduced by more than 90%. In one embodiment, the quantity of airborne particles generated by sanding the hardened joint compound of the present invention was less than 50 mg/m^3 and, in certain other embodiments, less than about 15 mg/m^3. The quantity of airborne particles generated by sanding the hardened joint compound is preferably less than 5 mg/m^3.

[0013] It is desirable that the dust reducing additive serve to suppress the formation of airborne particles without significantly interfering with the desired characteristics of the joint compound. Suitable dust reducing additives include oils, such as mineral oils, vegetable oils and animal oils, surfactants, oleoresinous mixtures, pitch, solvents, paraffins, waxes, including natural and synthetic wax, glycols, and other petroleum derivatives. Other materials which do not fit within the above categories may also effectively reduce the quantity of dust generated by a joint compound.

[0014] The joint compound formulations include a conventional filler material and a binder material, such as a resin. The joint compound can also include a surfactant, which may or may not serve to suppress airborne dust formation, and a thickening agent. Prior to hardening, the joint compound preferably includes a sufficient amount of water to form a mud-like spreadable material which can be applied to the wall surface. The present invention further provides an additive which can be admixed with conventional joint compounds to reduce the quantity of dust generated during sanding. The dust reducing additive can be used with both drying type (i.e. ready mixed) or setting type joint compounds.

[0015] The present invention also provides a method of reducing the quantity of airborne dust generated by sanding a fully hardened joint compound which includes mixing a sufficient quantity of a dust reducing additive with the joint compound prior to applying the joint compound to a wall surface.

[0016] It is also desirable that the present invention provide a joint compound having good plasticity, water retention, cohesiveness, viscosity stability, resistance to cracking, sandability, minimal shrinkage, good paint adherence, light weight, low cost, good hardening properties, and other properties comparable to those offered by conventional joint compounds.

[0017] These and other features and advantages of the invention will be apparent to those skilled in the art when considered in view of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWING

[0018] **FIG. 1** is a perspective view of the testing enclosure used to measure the quantity of airborne dust generated by sanding the wall repair compounds of the present invention.

DETAILED DESCRIPTION

[0019] According to the present invention, there are provided compositions suitable for filling and repairing cracks, holes, or other imperfections in a wall surface, such as the joints between adjacent wallboard panels. The compositions of the present invention include a dust reducing additive combined with conventional wall repair compound materials including a filler and a binder to form a low dust wall repair compound. Dust reducing additive refers to any ingredient capable of preventing, minimizing, suppressing, reducing, or inhibiting the formation of particles capable of becoming airborne. The expressions "airborne particles" or "airborne dust particles" refer to fine particles generated during the sanding or abrading of the compound which are capable of being carried by or through the air. Wall repair compound refers generally to compositions useful for filling and repairing cracks, holes, and other imperfections in surfaces such as drywall, wood, plaster, and masonry. Wall repair compounds include interior finishing and patch compounds such as joint compound, spackling compound, wood fillers, plasters, stucco, and the like. The joint compound can also include a thickener, and other materials found in conventional joint compounds.

[0020] Any conventional filler material can be used in the present invention. Suitable fillers include calcium carbonate ($CaCO_3$) and calcium sulfate dihydrate ($CaSO_4$-$2H_2O$ commonly referred to as gypsum) for ready mixed type joint compounds, and calcium sulfate hemihydrate ($CaSO_4$-½ H_2O) for setting type joint compounds. The joint compound can also include one or more secondary fillers such as glass micro bubbles, mica, perlite, talc, limestone, pyrophyllite,

silica, and diatomaceous earth. The filler generally comprises from about 25% to about 95% of the weight of the joint compound based on the total wet weight of the formulation (i.e. including water). More preferably, the filler comprises from about 55% to about 75% of the total wet weight, and most preferably, from about 60% to about 70%.

[0021] Another ingredient usually present in joint compounds is a binder or resin. Suitable binders include polyvinyl acetate, polyvinyl alcohol, ethylene vinyl acetate copolymer, vinylacrylic co-polymer, styrenebutadiene, polyacrylamide, other acrylic polymers, other latex emulsions, natural and synthetic starch, and casein. These binders can be used alone or in combination with one another. The amount of binder can range from about 1% to about 45% of the joint compound total wet weight. More preferably, the binder comprises from about 1% to about 20% of the total wet weight, and most preferably, from about 4% to about 14%. Preferred binders are Rhoplex HG 74M and Rhoplex AC 417M acrylic copolymers available from Rohm and Haas, Philadelphia, Pa.

[0022] A surfactant can also be included in the joint compound formulation, particularly when the dust reducing additive includes an oil. Certain surfactants have also been found to act as dust reducing additives by themselves. A preferred surfactant is Triton X-405, a nonionic surfactant available from Union Carbide Chemicals and Plastics Co. Inc., Danbury, Conn. The surfactant generally comprises less than about 3.5% of the joint compound total wet weight, and preferably less than about 0.25%.

[0023] Many joint compound formulations also contain a cellulosic thickener, usually a cellulosic ether. Suitable thickeners include methyl cellulose, hydroxypropyl cellulose, hydroxypropyl methyl cellulose, hydroxyethyl cellulose, hydroxyethyl methyl cellulose, hydroxyethyl hydroxypropyl cellulose, ethylhydroxyethyl cellulose, and sodium carboxymethyl cellulose (CMC). These thickeners can be used alone or in combination with one another. The amount of cellulosic thickener can range from about 0.1% to about 2% by weight of the joint compound. A preferred thickener is hydroxypropyl methyl cellulose available from Dow Chemical Company under the trade designation Methocel.

[0024] Another ingredient that can be included in the joint compound of the invention is a non-leveling agent. Suitable non-leveling agents include clays such as attapulgus clay, bentonite, illite, kaolin and sepiolite, and clays mixed with starches. Thickeners, such as those described above, can also function as non-leveling agents.

[0025] To provide a lighter weight joint compound, glass bubbles or a specially treated expanded perlite can be added as described in U.S. Pat. No. 4,454,267. Additional ingredients which can be utilized in the joint compound are preservatives, fungicides, anti-freeze, wetting agents, defoamers, flocculents, such as polyacrylamide resin, and plasticizers, such as dipropylene glycol dibenzoate.

[0026] In accordance with a characterizing feature of the present invention, the joint compound includes an ingredient which serves to minimize the quantity of airborne particles generated during sanding of the hardened joint compound. The additive generally comprises less than 20% of the joint compound total wet weight. More preferably, the dust reducing additive comprises between about 0.1% and about 10% of the joint compound by wet weight percent and, most preferably, between about 1.5% and about 6%.

[0027] Many ingredients have been found to effectively reduce the quantity of airborne particles generated when sanding the joint compound including oils such as animal, vegetable, and mineral oils (saturated and unsaturated), and oils derived from petroleum, pitch, natural and synthetic waxes, paraffins, solvents which evaporate slower than water, terpenes, glycols, surfactants, and mixtures thereof A preferred dust reducing additive is a mixture of mineral oil and an unsaturated oil, such as corn oil, comprising from about 1.5% to about 6% of the joint compound total wet weight, and a surfactant comprising from about 0.15% to about 0.40% of the joint compound total wet weight. It has also been found that increasing the level of resin in the joint compound may serve to reduce the level of airborne dust generated during sanding.

[0028] While the manner by which each additive serves to suppress the formation of particles capable of becoming airborne is not fully understood, some general observations have been made. For example, it was observed that the joint compounds containing a dust reducing additive seemed to produce particles which were larger and heavier than the particles produced by joint compounds without a dust reducing additive. Thus, the dust reducing additive may cause the dust particles to agglomerate or stick together, thereby forming large heavy particles which tend not to become or remain airborne. The invention, however, is not intended to be limited to any particular mechanism.

[0029] The relative quantity of the various ingredients can vary substantially in accordance with the invention. Table 1 shows the general range of each ingredient for either a setting type joint compound or a ready-mixed type joint compound in its wet condition:

TABLE 1

	Percent by Weight (Wet)
Filler	25–95%
Binder	1–45%
Thickener	<2%
Water	2–45%
Dust Reducing Additive	<20%

Test Procedure

[0030] The test procedure for measuring the quantity of airborne particles generated when sanding the hardened joint compound was as follows. First, each test specimen was prepared according to a specific formulation. The specific formulations for the various joint compounds are described more fully below along with the method used to prepare the specimens. The test specimens were approximately five inches long, one and one-half inches wide, and one quarter of an inch thick (5" by 1½" by ¼"). Before sanding, each test specimen was allowed to completely harden for at least twenty four hours at room temperature in an environment where the relative humidity generally ranged from about 25% to about 75%.

[0031] Referring to **FIG. 1**, there is shown the test enclosure **2** that was used to sand the test specimens **4***a*, **4***b*, **4***c* and measure the quantity of airborne dust particles generated.

The enclosure **2** was a rectangular box six feet high, four feet wide, and two feet wide (6'×4'×2'). The top **6**, bottom **8**, side **10**, and rear walls **12** of the enclosure **2** were constructed of wood, and the front wall **14** was constructed of transparent Plexiglas. A generally triangular access opening **16** located about one foot above the bottom wall **8** was provided in the front wall **14** to allow the individual conducting the test to insert his or her hand and arm into the enclosure and sand the specimen. The access opening **16** had a base dimension of about 7½ inches and a height of about 8½ inches. A movable cover member **18** was provided to allow the enclosure **2** to be completely sealed when sanding was completed. To sand the specimens **4***a*, **4***b*, **4***c*, the cover **18** was arranged in its up position as shown by the solid lines in **FIG. 1**. When sanding was completed, the cover **18** was pivoted downwardly to completely cover the access opening **16** as shown in phantom **18'**.

[0032] As shown, three specimens **4***a*, **4***b*, **4***c* of joint compound were prepared on a section of wallboard **20** and the section of wallboard **20** was clamped to a mounting block **22** arranged within the enclosure **2**. When tested, the specimens were located about twelve inches above the bottom wall **8** of the enclosure. Each specimen was tested individually and after each test, the enclosure was cleaned so that the quantity of airborne dust particles measured less than 0.05 mg/M^3. A particle counter **24** for measuring the quantity of airborne particles was mounted in the right side wall about forty eight inches above the center of the specimens **4***a*, **4***b*, and **4***c*.

[0033] The test specimens were sanded using a model B04552 power palm sander available from Makita Corporation of America, Buford, Ga. The sander included a 42×4 inch pad equipped with a 120 grit mesh sanding screen mounted over a 5×3½×¾ inch open, semi-rigid, non-woven, heavy duty, stripping, backing pad available from Minnesota Mining and Manufacturing Company, St. Paul Minn. Sanding was performed at a sanding speed of approximately 14,000 OPM (orbits per minute) using ordinary sanding pressure. Ordinary sanding pressure is defined as the amount of pressure typically required to sand a hardened joint compound. Sanding pressure, therefore, is the manual pressure typically applied by an ordinary person when sanding a joint compound. It will be recognized that the sanding pressure can vary depending on the hardness of the joint compound. Sanding was continued until the specimen was completely sanded. That is, the entire thickness of the specimen was sanded so that a generally smooth wall surface was produced. Care was taken to ensure that sanding was discontinued before the drywall itself was sanded. The amount of time required to sand each specimen varied depending on the hardness of the joint compound and the sanding pressure.

[0034] The quantity of airborne dust particles was measured starting from the time sanding was initiated until several minutes after sanding was discontinued. In general, the level of airborne dust was measured until the level decreased to less than 50% of its peak level. The quantity of airborne dust was measured using a DUSTTRAK™ aerosol monitor model 8520 available from TSI Incorporated, St. Paul, Minn. The particle counter measures the number of particles having a size of less than or equal to 10 microns. In the Examples, the peak or highest level of airborne dust measured during the test is presented.

Ingredients

[0035] A summary of the various ingredients used to prepare the joint compounds in each of the Examples is provided below:

[0036] Fillers

[0037] Calcium Carbonate—Marble Dust available from ECC International, Sylacauga, Ala.

[0038] Calcium Sulfate Dihydrate—available from J. T. Baker Chemical Co., Phillipsburg, N.J.

[0039] Mica—Mica AMC available from Kraft Chemical Co., Melrose Park, Ill. Mica prevents cracks from forming as the joint compound hardens.

[0040] Kaolin—Aldrich Chemical Co., Milwaukee, Wis.

[0041] Glass Bubbles—K1 (177 microns—0.14 g/cm^3) glass bubbles available from Minnesota Mining and Manufacturing Company, St. Paul, Minn. Glass bubbles improve the sandability of the joint compound and help to form a lighter weight joint compound.

[0042] Binders

[0043] Rhoplex HG 74M, Rhoplex HG 74P, Rhoplex AC 417M, Rhoplex 2620, and Rhoplex EC-2848—acrylic resins available from Rohm & Haas, Philadelphia, Penn.

[0044] Airflex RP-226—vinyl acetate-ethylene copolymer available from Air Products and Chemicals, Inc., Allentown, Penn.

[0045] Waxes

[0046] Octowax 321—available from Tiarco Chemical Div., Textile Robber & Chemical Co., Dalton, Ga.

[0047] Boler 1070—a paraffin wax available from Boler Inc., Wayne Penn.

[0048] Carbowax 540—synthetic wax available from Union Carbide Corp., Danbury, Conn.

[0049] Oils

[0050] Corn Oil—conventional corn oil. A suitable corn oil is available from Eastman Kodak Co., Rochester, N.Y.

[0051] Linoleic Acid—an unsaturated oil, available from Eastman Kodak Co., Rochester, N.Y.

[0052] Castor Oil—an unsaturated vegetable oil available from Aldrich Chemical Co., Milwaukee, Wis.

[0053] Tung Oil—an unsaturated vegetable oil available from Woodworkers Store, Medina, Minn.

[0054] Mineral Oil—Carnation light mineral oil available from Witco Corporation, Sonneborn Division, New York, N.Y.

[0055] Surfactants

[0056] Surfactants were generally included in the joint compound formulations when the dust reducing additive included an oil to help emulsify the oil and combine it with a water based joint compound. Certain

surfactants, however, were found to have a dust reducing effect when used by themselves.

[0057] FC 430—a nonionic surfactant available from Minnesota Mining and Manufacturing Company, Industrial Chemicals, St. Paul, Minn.

[0058] Triton X-405—a nonionic surfactant (octylphenoxy polyethoxy ethanol) available from Union Carbide Chemicals and Plastics Co. Inc., Danbury, Conn.

[0059] Variquat B-200—a cationic surfactant (benzyl trimethyl ammonium chloride 60%) available from Sherex Chemical Co. Inc., Dublin, Ohio.

[0060] Steol KS 460—an anionic surfactant (alkyl ether sulfate sodium salt 60%) available from Stephon Chemical Co., Northfield, Ill.

[0061] Span 85—a nonionic surfactant (sorbitan trioleate) available from ICI Americas Inc., Wilmington, Del.

[0062] Tween 80—nonionic surfactant (polysorbate 80) available from ICI Americas Inc., Wilmington, Del.

[0063] Solvents

[0064] Isopar M—an aliphatic hydrocarbon available from Exxon Chemical Co., Houston, Tex.

[0065] Norpar 15—a normal paraffin available from Exxon Chemical Co., Houston, Tex.

[0066] Heptane—available from Aldrich Chemical Co, Milwaukee, Wis.

[0067] Isopropanol—available from Aldrich Chemical Co, Milwaukee, Wis.

[0068] Propylene carbonate—available from Arco Chemical Co., Newton Square, Penn., under the trade designation Arconate HP.

[0069] Tripropylene glycol methyl ether available from Dow Chemical Co., Midland, Mich.

[0070] Tripropylene glycol-n-butyl ether available from Dow Chemical Co., Midland, Mich.

[0071] Ethylene glycol phenyl ether available from Dow Chemical Co., Midland, Mich.

[0072] D. Limonene—a terpene available from SCM Glidden Organics, Jacksonville, Fla.

[0073] Exxsol D-110—an aliphatic hydrocarbon available from Exxon Chemical Co., Houston, Tex.

[0074] Exxate 1300—C_{13} alkyl acetate available from Exxon Chemical Co., Houston, Tex.

[0075] Glycerol—available from J. T. Baker Chemical Co, Phillipsburg, N.J.

[0076] Thickener

[0077] Methocel 311—hydroxypropyl methylcellulose available from Dow Chemical Co., Midland, Mich.

EXAMPLES

[0078] The invention is illustrated by the following examples which present various embodiments of the invention. In general, the joint compounds were prepared by: (1) mixing the water and thickener, if any, with the binder; (2) adding the dust reducing additive; and (3) adding the fillers, mixing continuously. If the formulation contained a dust reducing additive in the form of an oil and a surfactant, the surfactant was typically added before the oil. More specific procedures used to prepare certain joint compound formulations are described more fully below.

[0079] Table 2 presents the test results for a control joint compound formulation which did not contain a dust reducing additive, along with the formulation and test results for Examples 1-3, each of which contained a dust reducing additive in the form of a wax. Each formulation is presented by wet weight percent of each ingredient, that is, including water.

TABLE 2

WAXES

	Formulations by Wet Weight Percent			
Ingredient	Control	1	2	3
Calcium carbonate	64.3	61.24	44.0	63.34
Mica		2.7		
Kaolin	1.0	2.1		1.04
Glass Bubbles	4.7		6.0	1.73
Rhoplex AC 417 M	10.1	9.8	17.0	
Airflex RP-226				5.23
Triton X-405		0.13	0.2	0.16
Stearic Acid			0.75	
28% Ammonium Hydroxide			0.38	
Water	19.9	16.9	24.17	24.87
Octowax 321		7.13		
Boler 1070			7.5	
Carbowax 540				3.63
Airborne Dust	72 mg/m^3	28 mg/m^3	3.5 mg/m^3	5 mg/m^3
Drying Time	1 day	1 day	1 day	1 day

[0080] The control formulation included a binder (Rhoplex AC 417 M), fillers (calcium carbonate, kaolin, and glass bubbles), and water. After being allowed to dry for one day, the specimen having the control formulation was sanded and found to produce a peak quantity of airborne dust particles having a size of less than or equal to 10 microns of 72 mg/m^3. In Example 1, the formulation includes approximately 7% by weight wax (Octowax 321) which reduced the quantity of airborne dust to 28 mg/M^3. In Example 2, the secondary fillers mica and kaolin have been replaced by glass bubbles, and a paraffin wax (Boler 321) was added. The quantity of dust generated by the resulting formulation was reduced to 3.5 mg/M^3.

[0081] The formulation of Example 2 was prepared by combining the wax and stearic acid and heating them to 170° F. until a clear liquid was formed. Approximately half of the water was then heated to 170° F. and added to the ammonium hydroxide. The wax-stearic acid mixture was then combined with the water-ammonium hydroxide mixture, and this mixture was cooled to room temperature while mixing continuously. In turn, the Rhoplex AC 417M, the Triton X-405, the remaining quantity of water, the calcium carbonate, and the glass bubbles were added and mixed to produce a uniform mixture.

[0082] The joint compound formulation in Example 3 contains a vinyl acetate binder (Airflex RP-226) and a wax

(Carbowax 540—polyethylene glycol). This joint compound formulation exhibited a dust level of 5 mg/m^3. Carbowax is synthetic wax which is soluble or miscible in water. While paraffins and Carbowax are both considered waxes, they are believed to represent dissimilar waxes.

[0083] Table 3A presents the formulations and test results for Examples 4-9, each of which contains one oil and a surfactant which serve to suppress the formation of airborne dust particles during sanding.

TABLE 3A

OILS

	Formulations by Wet Weight Percent					
Ingredient	4	5	6	7	8	9
Calcium Carbonate	54.94	54.72	54.72	55.15	56.41	56.6
Glass Bubbles	8.9	10.8	10.8	8.55	8.25	6.32
Rhoplex AC 417M	15.63	15.57	15.57	15.69	25.77	26.31
Triton X-405	0.39	0.39	0.39	0.39	0.21	0.21
Water	15.5	15.44	15.44	15.56	6.19	6.32
Corn oil	4.64					
Linoleic acid		3.08	3.08			
Castor oil				4.66		
Mineral oil					3.17	
Tung oil						4.24
Airborne Dust	2.3 mg/m^3	3.5 mg/m^3	45 mg/m^3	2.5 mg/m^3	7 mg/m^3	13 mg/m^3
Drying Time	1 day	1 day	30 days	2 days	1 day	2 days

[0084] In each example, the oil significantly reduced the quantity of airborne particles produced during sanding. It will be noted that Examples 5 and 6 had similar formulations. In Example 5, however, the specimen was permitted to dry for only 1 day and in Example 6, the specimen was permitted to dry for 30 days. By increasing the drying time from 1 day to 30 days, the quantity of airborne dust generated having a size less than or equal to 10 microns increased from 3.5 to 45 mg/M^3. It has generally been observed that unsaturated oils, such as unsaturated vegetable oils and linoleic acid, reduce the quantity of airborne particles generated after a short drying time (e.g. 1 day) without significantly affecting the adhesive properties of the joint compound. In addition, the joint compound can be sanded quite easily. After an extended drying time (e.g. 30 days), however, it has been observed that the joint compound becomes more difficult to sand and the quantity of airborne dust particles increases.

[0085] As shown in Example 8, mineral oil by itself was also found to significantly reduce airborne dust levels after a short drying time. In addition, mineral oil has been found to reduce airborne dust levels over an extended period of time. Mineral oil, however, was found to adversely affect the adhesive properties of the joint compound.

[0086] Table 3B presents the formulations and test results for Examples 10-15, each of which includes a dust reducing additive comprising a mixture of corn oil and mineral oil, and a surfactant. In each Example, the mineral oil and corn oil were premixed.

TABLE 3B

OIL MIXTURES

	Formulations by Wet Weight Percent					
Ingredient	10	11	12	13	14	15
Calcium Carbonate	68.65	63.69	63.69	58.07	61.05	61.05
Glass Bubbles		4.8	4.8	5.0	5.25	5.25
Mica	3.0					
Kaolin	2.4	0.99	0.99		3.0	3.0
Rhoplex AC 417M	11.0	9.9	9.9			
Rhoplex HG 74M				15.13	11.0	11.0
Triton X-405	0.15	0.15	0.15			
Variquat B-200					0.20	
Steol KS-460						0.20
FC 430				0.15		
Methocel 311				0.14		
Water	11.3	15.5	15.5	18.01	17.0	17.0
Corn oil	0.5	0.99	0.99	0.5	0.5	0.5
Mineral oil	3.0	3.98	3.98	3.0	2.0	2.0
Airborne Dust	5 mg/m^3	1.5 mg/m^3	5.5 mg/m^3	2.5 mg/m^3	10 mg/m^3	7 mg/m^3
Drying Time	1 day	1 day	19 days	4 days	4 days	4 days

[0087] The combination of mineral oil and an unsaturated oil, such as linoleic acid or corn oil which contains some linoleic acid, was found to be a low dust additive that did not significantly adversely affect the adhesive properties of the joint compound and also reduced airborne dust levels over an extended period of time.

[0088] Examples 11 and 12 have similar formulations but in Example 12, the drying time was increased to 19 days. As shown, the quantity of dust generated after 19 days increased only slightly. Thus, the dust reducing capability of the corn oil—mineral oil mixture remained much more stable over time than the formulations including linoleic acid presented in Examples 5 and 6.

[0089] Example 13 shows that significant dust reduction is also achieved when using a combination additive of corn oil and mineral oil in a joint compound that contains a thickener (i.e. Methocel 311). Example 13 was prepared by premixing the Methocel 311 with the water until a clear liquid was formed. The surfactant FC 430 and resin Rhoplex HG 74M were then added. Next, the mineral oil and corn oil were premixed and added to the other ingredients, mixing continuously. The calcium carbonate and glass bubbles were then added.

[0090] The formulations of the joint compounds in Examples 14 and 15 were similar but Example 14 included a cationic surfactant (Variquat B-200) and Example 15 included an anionic surfactant (Steol KS-460). In both examples, the mixture of corn oil and mineral oil together with the surfactant significantly reduced the quantity of airborne dust generated.

[0091] Tables 4A and 4B present the formulations and test results for Examples 16-28. These examples demonstrate the dust reducing effect of various solvents.

TABLE 4A

SOLVENTS

	Formulation by Wet Weight Percent					
Ingredient	16	17	18	19	20	21
Calcium Carbonate	61.18	69.69	63.12	60.18	48.90	60.49
Glass Bubbles	3.81	2.97	3.62	3.91	7.96	6.03
Kaolin						1.0
Rhoplex AC 417	13.09	10.22	12.44	13.43	30.8	
Rhoplex HG 74M						12.0
Triton X-405	0.24	0.19	0.22	0.25		0.15
FC 430					0.12	
Water	18.02	14.07	17.12	18.48	7.7	16.86
Propylene carbonate	3.66					
Tripropylene glycol methyl ether		2.86				
Tripropylene glycol-n butyl ether			3.48			
Ethylene glycol phenyl ether				3.75		
D. limonene					4.52	
Glycerol						3.47
Airborne Dust	14 mg/m^3	7.5 mg/m^3	3.5 mg/m^3	4.5 mg/m^3	5 5 mg/m^3	19.5 mg/m^3
Drying Time	2 days	3 days	2 days	2 days	1 day	1 day

[0092]

TABLE 4B

SOLVENTS

	Formulations by Wet Weight Percent						
Ingredient	22	23	24	25	26	27	28
Calcium carbonate	69.95	69.95	68.31	68.31	70.69	68.65	69.95
Mica	3.0	3.0				3.0	3.0
Kaolin	2.4	2.4				2.4	2.4
Glass Bubbles			3.1	3.1	2.86		
Rhoplex AC 417 M	7.0	7.0	10.6	10.6	9.82	11.0	7.0
Triton X-405	0.15	0.15	0.19	0.19	0.18	0.15	0.15
Water	14.0	14.0	14.6	14.6	13.5	11.3	14.0
Heptane	3.5						
Isopropanol		3.5					
Isopar M			3.2	3.2			
Norpar 15					2.95		
Exxsol D-110						3.5	
Exxate 1300							3.5
Airborne Dust	105 mg/m^3	160 mg/m^3	7.5 mg/m^3	110 mg/m^3	27 mg/m^3	15 mg/m^3	12.8 mg/m^3
Drying Time	1 day	1 day	1 day	5 days	5 days	1 day	1 day

[0093] As shown in Examples 22 and 23, not all solvents are effective at reducing the quantity of airborne dust. In addition, Examples 24 and 25 demonstrate that an additive may be effective at reducing the quantity of dust generated for a given period of time, but that the level of dust will increase over time as the additive evaporates. Such a formulation may be desirable since the additive, depending on its volatility, can provide dust reduction for a predetermined period of time but will dissipate from the joint compound, thereby leaving a joint compound having properties similar to joint compounds without any dust reducing additive.

[0094] Table 5 presents the test results for Examples 29-33 which show the level of airborne dust generated by formulations containing different surfactants.

TABLE 5

SURFACTANTS

	Formulations by Wet Weight Percent				
Ingredient	29	30	31	32	33
Calcium Carbonate	63.91	61.05	61.05	62.98	62.57
Kaolin		3.0	3.0	1.03	1.03
Glass Bubbles	5.01	5.25	5.25	4.02	4.61
Rhoplex HG 74M	11.03	11.0	11.0	11.35	11.28
Water	17.04	17.0	17.0	17.53	17.43
Triton X-405	3.01				
Variquat B-200		2.7			
Steol KS-460			2.7		
Span 85				3.09	
Tween 80					3.08
Airborne Dust	65 mg/m^3	63 mg/m^3	42 mg/m^3	10 mg/m^3	8.5 mg/m^3
Drying Time	1 day	4 days	4 days	5 days	5 days

[0095] It will be noted that in Examples 29-33, the percentage of surfactant added to the joint compound formulations was significantly greater than the quantity used to emulsify the oil in Examples 4-15 which ranged from 0.15 to 0.39 percent by weight. In Example 29, the nonionic surfactant Triton X-405 was found to only slightly reduce the quantity of airborne dust compared to the control formulation. Similarly, in Example 30, the cationic surfactant Variquat B-200 was found to slightly reduce the quantity of airborne dust. In Example 31, the anionic surfactant Steol KS-460 was found to moderately reduce the quantity of airborne dust. It was noted that each of the surfactants in Examples 29-31 was initially solid materials which had to be solubilized in water.

[0096] In Examples 32 and 33, the surfactants were liquids which did not dry easily. In Example 32, the nonionic surfactant Span 85, which is insoluble in water and has an HLB of 1.8, was found to have a significant dust reducing effect. In Example 33, Tween 80, which is soluble in water and has an HLB of 15, was found to have a significant dust reducing effect. It was therefore observed from Examples 32 and 33 that liquid surfactants which do not dry quickly may themselves serve as effective dust reducing additives.

[0097] Table 6A presents the formulations and test results of Examples 34-36 which show the effect that different resins had on dust generation.

TABLE 6A

DIFFERENT RESINS

	Formulations by Wet Weight Percent		
Ingredient	34	35	36
Calcium Carbonate	63.45	64.05	62.23
Kaolin	1.0	1.0	2.91
Glass Bubbles	5.5	4.9	5.10
Triton X-405	0.45	0.15	0.15
Water	19.6	19.8	16.5
Rhoplex AC 417M	10.0		
Rhoplex HG 74M		10.1	10.68
Corn oil			0.49
Mineral oil			1.94
Airborne Dust	51 mg/m^3	81 mg/m^3	7 mg/m^3
Drying Time	1 day	1 day	1 day

[0098] Examples 34 and 35 show that Rhoplex AC 417M, a softer resin than Rhoplex HG 74M, may slightly reduce the level of airborne dust. In Example 36, when a dust reducing additive in the form of a corn oil mineral oil mixture was added, the level of dust generated was reduced significantly.

[0099] Table 6B presents the formulations and test results for Examples 37-39 which contained a high level of resin.

TABLE 6B

HIGH RESIN LEVELS

	Formulations by Wet Weight Percent		
Ingredient	37	38	39
Calcium Carbonate	58.29	61.02	59.61
Kaolin	0.96	1.01	1.02
Glass Bubbles	5.6	1.11	3.41
Triton X-405	0.15	0.16	0.15
Rhoplex HG 74M	35.0		
Rhoplex 2620		36.7	
Rhoplex EC-2848			35.81
Airborne Dust	30 mg/m^3	6 mg/m^3*	6.5 mg/m^3*
Drying Time	1 day	1 day	1 day

*test discontinued prior to complete sanding of specimen

[0100] In each formulation, the quantity of resin was at least 35% by weight. While each of the resins included approximately 50% by weight water, it will be noted that no additional water was added to any of the joint compound formulations. Rhoplex HG 74M is a harder resin than Rhoplex 2620 and EC-2848. The quantity of airborne dust generated for the formulations in Examples 37-39 was found to be less than the quantity of airborne dust generated by the control joint compound formulation in Table 2, but the formulations in Examples 37-39 were found to have objectionable sanding properties. During the testing of the specimens of Examples 38 and 39, only half of the specimen could be sanded due to the rubbery nature of the joint compound.

[0101] Table 6C presents the formulations and test results for joint compounds containing a vinyl acetate binder (Air-

flex RP-226). The control formulation contains a small quantity of surfactant which may serve to slightly reduce dust generation but is otherwise free of a dust reducing additive. Example 40 contains a dust reducing additive in the form of a mixture of corn oil and mineral oil which was found to significantly reduce the quantity of dust generated.

TABLE 6C

VINYL ACETATE BINDER

Ingredient	Formulations by Wet Weight Percent: Control	40
Calcium Carbonate	63.01	62.87
Kaolin	1.03	1.03
Glass Bubbles	2.07	2.45
Triton X-405	0.15	0.15
Water	28.54	24.7
Airflex RP-226	5.2	5.19
Corn Oil		0.52
Mineral Oil		3.09
Airborne Dust	84 mg/m^3	3 mg/m^3
Drying Time	1 day	1 day

[0102] Table 7 presents the results for tests conducted by applying the dust reducing additive as a coating to a fully hardened joint compound. In each test, a specimen formed of Light Weight All Purpose Joint Compound available from United States Gypsum Co., Chicago, Ill. was prepared and allowed to harden for 4 days. The hardened joint compound was then saturated with the dust reducing additive and allowed to dry for an additional period of time, either 7 hours or 24 hours. The specimens were then sanded. It was found that when applied as a coating, the dust reducing additive served to significantly reduce the quantity of airborne dust particles generated by the joint compound.

TABLE 7

DUST REDUCING ADDITIVE APPLIED AS A COATING

	Exxsol D 110	Isopar M
Airborne Dust (Dried 7 hours)	4 mg/m^3	7.5 mg/m^3
Airborne Dust (Dried 24 hours)	4 mg/m^3	27 mg/m^3

[0103] Table 8 presents the formulations and test results for joint compound formulations containing a calcium sulfate dihydrate filler material. In Example 41, a significant reduction in airborne dust generation was achieved by including a dust reducing additive comprising a mixture of surfactant, corn oil, and mineral oil in the joint compound.

TABLE 8

CALCIUM SULFATE DIHYDRATE FILLER

Ingredient	Formulations by Wet Weight Percent: Control	41
Calcium Sulfate Dihydrate	70.36	66.6
Rhoplex HG 74M	8.64	9.7
Water	21	19.3
Triton X-405		0.2
Corn oil		0.7
Mineral oil		3.5
Airborne Dust	225 mg/m^3	20 mg/m^3
Drying Time	1 day	1 day

[0104] Table 9 presents test results obtained using several commercially available joint compounds.

TABLE 9

CONVENTIONAL JOINT COMPOUNDS - NO ADDITIVE

Conventional Joint Compound	Airborne Dust	Drying Time
All Purpose Joint Compound	100 mg/m^3	3 days
Light weight All Purpose Joint Compound	155 mg/m^3	3 days
Gold Bond Pro Form Prof. Lite Joint Compound	90 mg/m^3	4 days
Easy Sand 90 Setting Joint Compound	280 mg/m^3	3 days

[0105] The first three joint compounds are ready-mixed type joint compounds manufactured and marketed by United States Gypsum Co., Chicago, Ill., and Easy Sand 90 is a setting type joint compound manufactured by National Gypsum Co., Charlotte, N.C.

[0106] Table 10 shows the effect of adding a dust reducing additive to the conventional joint compounds of Table 9.

TABLE 10

CONVENTIONAL JOINT COMPOUND WITH ADDITIVE

Ingredient	Formulations by Wet Weight Percent: All Purpose Joint Compound	Light weight All Purpose Joint Compound	Gold Bond Pro Formula Professional Lite Joint Compound	Easy Sand 90 Setting Joint Compound
Joint Compound	96.35	96.35	96.35	67.74
Corn oil	0.5	0.5	0.5	0.51
Mineral oil	3.0	3.0	3.0	4.1

TABLE 10-continued

CONVENTIONAL JOINT COMPOUND WITH ADDITIVE

	Formulations by Wet Weight Percent			
Ingredient	All Purpose Joint Compound	Light weight All Purpose Joint Compound	Gold Bond Pro Formula Professional Lite Joint Compound	Easy Sand 90 Setting Joint Compound
Triton X-405	0.15	0.15	0.15	0.15
Water				27.5
Airborne Dust	2 mg/m^3	12 mg/m^3	5 mg/m^3	13 mg/m^3
Drying Time	3 days	1 day	1 day	2 days

[0107] In each case, a premixed dust reducing additive including corn oil, mineral oil, and the surfactant Triton X-405 was added to each of the conventional joint compounds just prior to preparing the specimens, thereby serving to significantly reduce the quantity of airborne dust generated by sanding the hardened joint compound.

[0108] Table 11 presents the results obtained when a conventional spackling compound, also referred to as a wall repair compound, was tested.

TABLE 11

SPACKLING COMPOUND

	Control	42
Spakfast	100	95.35
Corn oil		0.5
Mineral oil		4.0
Triton X-405		0.15
Airborne Dust	11 mg/m^3	3 mg/m^3

[0109] Spakfast is a wall repair compound available from Minnesota Mining and Manufacturing Company, St. Paul, Minn. Spakfast contains a high level of resin and exhibits a relatively low level of airborne dust. The level of airborne dust generated, however, was found to be significantly reduced when a dust reducing additive including corn oil, mineral oil, and a surfactant was added to the Spakfast formulation. Thus, according to the present invention, a dust reducing additive can be added to a conventional spackling compound to significantly reduce the quantity of airborne dust generated by the spackling compound.

[0110] While the formulations of each example has been presented in terms of the weight percent of each ingredient, it will be recognized that the formulations can also be presented in terms of the volume percent of each ingredient. By way of example, Table 12 presents two representative formulations in terms of both percent by weight and percent by volume.

TABLE 12

FORMULATION IN WEIGHT VOLUME PERCENT

	Formulation 1		Formulation 2	
Ingredient	% by Wt	% by Vol	% by Wt	% by Vol
Calcium Carbonate	62.23	25.66	54.73	14.82
Glass Bubbles	5.10	40.55	10.8	59.12
Kaolin	2.91	1.47	1	0.34
Rhoplex HG 74P	10.68	10.8	15.57	11.69
Triton X-405	0.15	0.15	0.15	0.11
Water	16.5	18.37	15.25	11.68
Corn oil	0.49	0.60	0.5	0.42
Mineral oil	1.94	2.40	2	1.82

[0111] Since glass bubbles have a low density and calcium carbonate has a high density, the percentage of glass bubbles increases significantly while the percentage of calcium carbonate decreases significantly when converting the formulation from one based on weight to one based on volume.

[0112] The patents, patent documents, and patent applications cited herein are incorporated by reference in their entirety as if each were individually incorporated by reference. It will be apparent to those of ordinary skill in the art that various changes and modifications may be made without deviating from the inventive concept set forth above. Thus, the scope of the present invention should not be limited to the structures described in this application, but only by the structures described by the language of the claims and the equivalents of those structures.

What is claimed is:

1. A joint compound composition comprising a filler, a binder, a thickener and one or more synthetic polymeric waxes, wherein each of said one or more waxes is at least slightly soluble in water and forms a solid at room temperature.

2. The composition of claim 1 wherein said joint compound comprises at least 50 wt % of said filler on a dry basis.

3. The composition of claim 1 wherein each of said polymeric waxes has an average melting temperature from about 80° F. (27° C.) to 150° F. (66° C.).

4. The composition of claim 1 wherein said binder comprises a latex binder.

5. The composition of claim 1 wherein said wax is present in a concentration of about 0.1 wt % to about 8.0 wt % on a dry basis.

6. The composition of claim 1 wherein said filler comprises at least one of calcium carbonate, calcium sulfate dihydrate or calcium sulfate hemihydrate.

7. The composition of claim 1 wherein at least one of said synthetic waxes comprises polyethylene glycol.

8. The composition of claim 1 wherein said polymeric wax is present in a concentration of about 0.5 wt % to about 6.0 wt % on a dry basis.

9. A method of finishing ajoint between adjacent gypsum board panels comprising applying a composition to said joint, said composition comprising water, a filler, a binder, a thickener and at one or more synthetic polymeric waxes, each of which is at least slightly soluble in water and forms a solid at room temperature.

10. The method of claim 9 further comprising taping said joint.

11. The method of claim 9 further comprising allowing said composition to dry and sanding said joint.

12. A joint compound composition comprising a filler, a binder, and wax.

13. A joint compound composition as defined in claim 12, wherein the wax comprises a polymeric wax.

14. A joint compound composition as defined in claim 12, wherein the wax comprises a synthetic wax.

15. A joint compound composition as defined in claim 14, wherein the wax is soluble in water.

16. A joint compound composition as defined in claim 12, wherein the wax comprises paraffin wax.

17. A joint compound composition as defined in claim 12, wherein the wax comprises from about 1.5% to about 6% of the joint compound total wet weight.

18. A joint compound composition as defined in claim 12, wherein the filler is selected from the group consisting of calcium carbonate, calcium sulfate dihydrate, and calcium sulfate hemihydrate.

19. A joint compound composition as defined in claim 18, wherein the filler comprises from about 25% to about 95% of the joint compound total wet weight.

20. A joint compound composition as defined in claim 12, wherein the binder is selected from the group consisting of acrylic resins and vinyl acetate copolymers.

21. A joint compound composition as defined in claim 20, wherein the binder comprises from about 1% to about 45% of the join compound total wet weight.

* * * * *

EXHIBIT 4

Westlaw.
Not Reported in F.Supp.2d
Not Reported in F.Supp.2d, 2005 WL 1651167 (N.D.Ill.)
(Cite as: Not Reported in F.Supp.2d)

▷
Bowe, Bell + Howell Co. v. MidSouth Technologies, LLC
N.D.Ill.,2005.
Only the Westlaw citation is currently available.
United States District Court,N.D. Illinois, Eastern Division.
BOWE, BELL + HOWELL COMPANY, Plaintiff,
v.
MIDSOUTH TECHNOLOGIES, LLC, Defendant.
No. Civ.A. 05C-571.

June 30, 2005.

Margaret M. Duncan, Linda A.O. Lamberson, Matthew Edward Leno, McDermott, Will & Emery LLP, Chicago, IL, for Plaintiff.
Jonathan Stephen Polish, Max A. Stein, Sachnoff & Weaver, Ltd., Chicago, IL, for Defendant.

MEMORANDUM OPINION AND ORDER

ANDERSEN, J.

***1** This matter is before the Court on defendant MidSouth Technologies, LLC's ("MidSouth") motion to dismiss for lack of personal jurisdiction pursuant to Federal Rule of Civil Procedure 12(b)(2) and for improper venue pursuant to Rule 12(b)(3) or, in the alternative, to transfer this case to the United States District Court for the Northern District of Oklahoma pursuant to 28 U.S.C. § 1404(a). For the following reasons, the motion to dismiss is denied but the motion to transfer is granted and this case is transferred to the United States District Court for the Northern District of Oklahoma.

BACKGROUND

MidSouth and Bowe, Bell + Howell Company ("Bowe, Bell + Howell") sell mail sorting and processing equipment and the software necessary to run that equipment. Within the past year, MidSouth has offered for sale certain computer software to be used in mail processing equipment. Bowe, Bell + Howell claims that this software infringes U.S. Patent Nos. 5,912,979 and 6,078,678, which it owns. In September, 2004, Bowe, Bell + Howell began contacting MidSouth regarding a potential enforcement action involving these patent rights.

On October 21, 2004, MidSouth filed an action in the United States District Court for the Northern District of Oklahoma under the Declaratory Judgment Act seeking resolution of Bowe, Bell + Howell's patent infringement claims against MidSouth.

Subsequently, Bowe, Bell + Howell filed a patent infringement action against MidSouth in this Court on January 31, 2005, alleging infringement of the very same patents that are the subject of the pending action in Oklahoma. The issues and the parties in the two cases are identical. On February 25, 2005, MidSouth filed a motion to dismiss this case for lack of personal jurisdiction pursuant to Federal Rule of Civil Procedure 12(b)(2) and for improper venue pursuant to Rule 12(b)(3) or, in the alternative, to transfer this case to the United States District Court for the Northern District of Oklahoma pursuant to 28 U.S.C. § 1404(a).

DISCUSSION

This action was filed over three months after MidSouth filed its declaratory judgment action in the Northern District of Oklahoma. The Oklahoma lawsuit will resolve all the issues in controversy between these two parties. The "first-filed doctrine" has evolved to address this situation and has been applied vigorously in patent actions. The doctrine dictates that this patent infringement action be dismissed in favor of the previously filed action in Oklahoma, or at least transferred to that district where MidSouth's declaratory judgment action is currently pending.

The leading case on the application of the first-filed doctrine in patent lawsuits is *Genentech, Inc. v. Eli Lilly & Co.*, 998 F.2d 931 (Fed.Cir.1993). In that case, the district court in Indiana had dismissed the first-filed declaratory judgment action in favor of a patent infringement action filed one day later in California. The Federal Circuit reversed, holding as follows:

***2** We prefer to apply in patent cases the general rule whereby the forum of the first-filed doctrine is favored, unless considerations of judicial and litigant economy, and the just and effective disposition of disputes, require otherwise.... The general rule favors the forum of the first-filed action, whether or not it is a declaratory action.

Id., at 937.That Court went on to hold, essentially, that it is irrelevant that the first-filed action is a declaratory action alleging non-infringement, instead of a direct infringement action by the patentee.The considerations affecting transfer to or dismissal in favor of another forum do not change simply because the first-filed action is a declaratory action. When the declaratory action can resolve the various legal relations in dispute and afford relief from the controversy that gave rise to the proceeding, and absent sound reason for a change of forum, a first-filed declaratory action is entitled to precedence as against a later-filed patent infringement action.

Id., at 938.Perhaps most importantly, the court in *Genentech* expressly rejected the principle previously applied in some cases, arising from *Tempco Electric Heater Corp. v. Omega Engineering, Inc.*, 819 F.2d 746 (7th Cir.1987), that a declaratory judgment action should be dismissed if it was filed as "forum shopping" and a direct infringement action was later filed. In *Genentech*, the Federal Circuit said that doctrine improperly shifts to patentees the preferred choice of forum: "This shift of relationship between litigants is contrary to the purpose of the Declaratory Judgment Act to enable a person caught in controversy to obtain resolution of the dispute, instead of being forced to await the initiative of the antagonist."998 F.2d at 937.

After *Genentech*, the courts have routinely dismissed subsequently filed actions by patentees in favor of first-filed declaratory actions. Indeed, this Court has applied the doctrine both before and after *Genentech*. *See e.g.*, *Roadmaster Corp. v. NordicTrack, Inc.* 1993 WL 625537 (N.D.Ill.1993); *Joslyn Manufacturing Co. v. Amerace Corp.*, 729 F.Supp. 1219 (N.D.Ill.1990).

Of course, *Genentech* and later cases have recognized exceptions to the first-filed rule when it would be "unjust or inefficient to continue the first-filed action."*Genentech*, 998 F.2d at 938. An exception is made for the sake of avoiding injustice or inefficiency when the "convenience and availability of witnesses" dictates keeping the case in the second-filed forum. Bowe, Bell + Howell argues that this Court is a more convenient forum due to the availability of officers and employees who may be witnesses here. However, MidSouth contends that the Oklahoma forum is more convenient for its own employees and officers. At best, this factor is equal between the two forums. Many courts have found that when there is such equivalency, convenience becomes a non-factor and is, therefore, insufficient to overcome the strong presumption in favor of the forum of the first-filed action. *See e.g.*, *Chiron Corp. v. Advanced Chemtech, Inc.*, 869 F.Supp. 800, 802 (N.D.Cal.1994) ("it will be inconvenient for certain witnesses no matter where the action proceeds"); *Brower v. Flint Ink Corp.*, 865 F.Supp. 564, 568 (N.D.Iowa 1994) ("Allowing this second-filed action to continue would merely shift the burden of litigating in a 'foreign' forum from Brower to Flint, just as a transfer of this Iowa action to Michigan would merely shift the burden of litigating in a 'foreign' forum from Flint to Brower; therefore, the court concludes that the 'balance of convenience' is flat").

***3** These principles dictate dismissing this action in favor of the action filed eight months ago in Oklahoma. However, a less drastic alternative to dismissal would be transferring this action to the Oklahoma Court for consolidation with the action filed there by MidSouth. Section 1404(a), which addresses whether a transfer to another venue is appropriate, requires the district court to weigh three factors in making this assessment: (1) the convenience of the parties; (2) the convenience of the witnesses; and (3) the interests of justice. *Coffey v. Van Dorn Iron Works*, 796 F.2d 217, 219-20 (7th Cir.1986).

In this case, the first two prongs of convenience are evenly balanced on both sides. MidSouth filed the first action in Oklahoma because that forum was most convenient to it and to its relevant witnesses. Furthermore, MidSouth notes that its choice of forum is consistent with the general principle that patent cases should be adjudicated in the closest possible forum to the area of the infringing device and the hub of activity centered around its production, such as the product's development, testing, research, marketing and sales. Therefore, MidSouth contends that these considerations support the Northern District of Oklahoma as the proper forum. However, Bowe, Bell + Howell is incorporated in Illinois and all of its material witnesses, including the inventor of the allegedly infringed patents, the research and development team for the patented technology, and the lawyers who drafted the patents, are in the Chicago metropolitan area. Therefore, the convenience factors do not provide a clear answer as to the most appropriate forum for the adjudication of these issues.

However, the interests of justice mandate that the first-filed doctrine should be applied to this case. The

defendants here filed a legitimate declaratory action in the Northern District of Oklahoma prior to the filing of this patent infringement action by Bowe, Bell + Howell. That first-filed action involves the same exact parties and seeks to resolve identical issues as those presented before this Court. For the sake of judicial economy, this Court chooses to transfer Bowe, Bell + Howell's patent infringement action to the Northern District of Oklahoma where MidSouth's declaratory judgment action is currently pending.

CONCLUSION

For all of the foregoing reasons, MidSouth's motion to dismiss, or in the alternative to transfer, is granted in part and denied in part. The motion to transfer is granted, and this case is transferred to the Northern District of Oklahoma. The motion is denied in all other respects.

N.D.Ill.,2005.
Bowe, Bell + Howell Co. v. MidSouth Technologies, LLC
Not Reported in F.Supp.2d, 2005 WL 1651167 (N.D.Ill.)

END OF DOCUMENT